Life-History Data on the Alewife and Blueblack Herring of the Saint John River, New Brunswick, 1981

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Le titre exact paraît au haut du résumé de chaque rapport.

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ABSTRACT

Jessop, B.M., W.E. Anderson and A.H. Vromans. 1983. Life-history data on the alewife and blueback herring of the Saint John River, New Brunswick, 1981. Can. Data Rep. Fish. Aquat. Sci. No. 426. viii + 37. p.

Life-history data were collected in 1981 from alewife and blueback herring captured at the Mactaquac Dam and by the commercial trap-net fishery of the lower Saint John River, New Brunswick. This report tabulates the data, in various combinations, according to species, sex, length, weight, age, maturity and spawning history.

Key words: Life-history, alewife, blueback herring, gaspereau, anadromous, Mactaquac Dam, commercial fishery, Saint John River.

RÉSUMÉ

Jessop, B.M., W.E. Anderson and A.H. Vromans. 1983. Life-history data on the alewife and blueback herring of the Saint John River, New Brunswick, 1981. Can. Data Rep. Fish. Aquat. Sci. No. 426. viii + 37 p.

En 1981, on a recueilli des données relatives au cycle biologique du gaspereau et de l'alose d'été capturés au barrage de Mactaquac et par les pêcheurs de filets trappes commerciaux de la basse rivière Saint-Jean, au Nouveau-Brunswick. Ce rapport présente les données sous forme de tableaux, en les combinants de diverses façons, selon l'espèce, le sexe, la longueur, le poids, l'âge, la maturité et l'historique du frai.

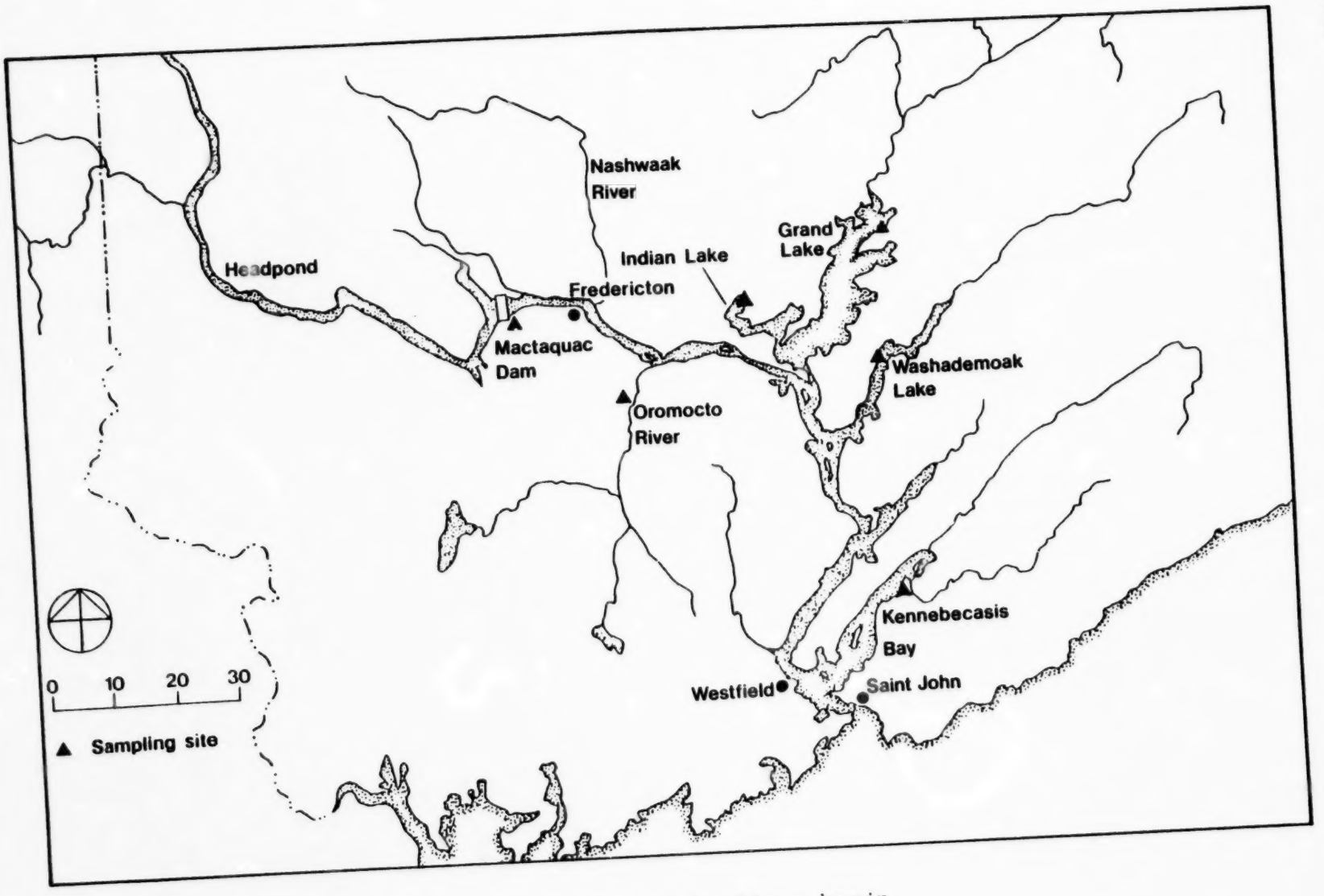

FIG. 1. Sampling sites in the lower Saint John River basin.

INTRODUCTION

A commercial fishery for gaspereau (the term refers collectively to the alewife, Alosa pseudoharengus, and the blueback herring, A. aestivalis) has been conducted for many years in the Saint John River, New Brunswick (Fig.). The 1981 data, presented in this report, were collected as part of a continuing program of periodic sampling of the fishery catch, with the objective of establishing a data base for the evaluation of management practices and trends in the fishery. Comparative data for the years 1973 through 1975 are provided in Jessop 1977*a,b* and *c*).

METHODS

The commercial trap-net fishery was sampled weekly during most or all of the fishing season at five sites in Fishery Districts 55, 56 and 57: the Kennebecasis Bay, Washademoak Lake, Grand Lake, Indian Lake and the Oromocto River (Fig.). The main stem of the Saint John River was sampled at Mactaquac Dam in Fishery District 58. A controlled commercial fishery has operated at Mactaquac Dam since 1974 but no trap-net fishing is permitted in the main stem of the river. The duration of the fishery varied between sites according to time of ice-free conditions, local run timing and the decisions of individual fishermen. At each site, a maximum of 100 fish were collected weekly, by taking several representative dip-net scoops from the barge into which fish were loaded in the trap-net fishery, and twice weekly by dipping from the brail-pool of the fishway at Mactaquac Dam.

Fork and total lengths, weight, sex, maturity and species were recorded and a scale sample was obtained from each fish collected. All lengths were measured to the nearest millimetre and weights to the nearest gram. Fork lengths were used exclusively in the data analysis. Sex and stage of maturity according to Nikolsky's (1963) maturity classification, were established by dissection; while species identification was based on body conformity and peritoneal color (Bigelow and Schroeder 1953) and cross-checked by scale imbrication pattern (MacLellan et al. 1981).

Whenever possible, scales were taken from the left side of each fish, just above the lateral line and behind the posterior edge of the dorsal fin. Eight to ten scales were placed on transparent plastic slides (Power 1964), and each sample was independently aged twice without reference to associated length or weight data. If readings differed, a third reading was made and a final age assigned on the basis of majority agreement. A few fish were unageable due primarily to scales with regenerate centers.

Age was determined for adult fish by counting the number of annuli and spawning marks and adding a year for the scale edge (Cating 1953; March 1969). Fish under Age 4 frequently exhibited plus (+) growth, and judgement based upon capture date was used in deciding whether or not to add a year for the scale edge. Scale analysis included counting the number of transverse grooves per annulus for comparison with prepared tables of cumulative transverse groove frequency per annulus, as one criterion for assessing checks that were difficut to interpret.

The age at first spawning of mature, virgin (no previous spawns evident on scales) gaspereau was recorded as the age at capture during the spawning run. A small proportion of older, mature fish show checks, sometimes resembling spawning checks, between annuli laid previously at Age 2 and, occasionally, at Age 3. Such checks at Age 2 are presumed not to be spawning marks but evidence of freshwater entry, because virtually all (>99%) Age-2 fish sampled have been sexually immature and small numbers of immature fish (mostly alewives [>85%] and mostly Age 2, but with a few [<5%] Age 3 and Age 1) are frequently found in the lake system of the lower Saint John River, e.g., Washademoak and Grand lakes, during the latter part of the spawning run (mid- to late June). Non-annular checks at Age 3 were considered as spawning marks if well defined erosion and little plus growth to the annulus were evident; otherwise they were considered freshwater checks. The effect on spawning history patterns of any errors in judgement should be minimal, given the small numbers of fish involved.

RESULTS AND DISCUSSION

A total of 4,425 fish were collected from all sites between 7 May and 30 June. Sampling was distributed as follows:

Location	Sample Period	Number
Kennebecasis Bay	13 May-25 Jun	570
Washademoak Lake	8 May-26 Jun	676
Grand Lake	8 May-12 Jun	600
Indian Lake[1]	7 May- 3 Jun	500
Oromocto River	8 May-11 Jun	583
Mactaquac Dam	12 May-30 Jun	1,496

[1]Refers more properly to the French and Indian Lake complex since fish may, at times, have also been caught in French Lake.

The data have been tabulated in a variety of formats according to species, location, sex, length, weight, age, maturity and spawning history (Tables 1-24). Between tables, totals may not always agree due to incomplete data; i.e., unageable scales.

No analysis has been presented of the data contained in this report; rather, it has been presented in a wider variety of formats than might be used in a technical report.

Conversion between fork and total lengths can be made for alewives in the fork-length interval from 130 to 320 mm and for blueback herring in the interval from 180 to 270 mm, respectively, by using the following geometric mean regressions (Ricker 1973): (a) $Y = 0.8819X + 0.0054$, $n = 302$, $r^2 = 0.998$ and (b) $Y = 0.8857X + 1.4413$, $n = 198$, $r^2 = 0.992$, where Y = fork length and X = total length. For alewives, the symmetrical 95% confidence intervals about an estimated value of $Y(\hat{Y})$ were ±0.68, ±0.42, ±0.28, ±0.42 and ±0.68 mm at X values of 150, 200, 250, 300 and 350 mm, respectively. For blueback herring, the 95% confidence intervals about an estimated value of Y were ±1.10, ±0.60, ±0.27 and ±0.60 mm at X values of 150, 200, 250 and 300 mm, respectively.

ACKNOWLEDGEMENTS

We gratefully acknowledge the cooperation of gaspereau fishermen R. Robinson, A. Cormier, H. Cunningham, R. Coughlan, P. McFadden, Allan Chapman and Neil Thorne in the process of sample collection and the efforts of an able crew of summer students in collecting the sample data.

TABLE 1. Mean fork lengths, by sample date and location, for gaspereau from the Saint John River, 1981.

Date	Kennebecasis Bay n	Mean length (mm)	SD	Washademoak Lake n	Mean length (mm)	SD	Grand Lake n	Mean length (mm)	SD	Indian Lake n	Mean length (mm)	SD	Oromocto River n	Mean length (mm)	SD	Mactaquac Dam n	Mean length (mm)	SD
Blueback herring																		
May 3-9	0	-	-	0	-	-	0	-	-	1	267.0	-	0	-	-	0	-	-
May 10-16	1	267.0	0.00	0	-	-	0	-	-	0	-	-	2	267.0	8.48	0	-	-
May 17-23	61	267.9	14.19	16	257.5	14.38	18	249.3	15.72	0	-	-	0	-	-	0	-	-
May 24-30	98	264.0	15.69	57	244.5	15.24	47	246.0	17.97	9	250.8	17.06	36	245.8	15.79	6	260.0	13.16
May 31-Jun 6	95	265.1	17.11	97	233.7	15.34	42	246.1	14.17	34	239.1	14.41	49	241.5	15.16	70	259.2	15.36
Jun 7-13	0	-	-	88	228.6	17.51	59	246.1	16.73	0	-	-	47	239.0	17.46	157	255.8	15.37
Jun 14-20	70	260.4	22.69	0	-	-	0	-	-	0	-	-	0	-	-	178	250.0	16.33
Jun 21-27	100	248.3	26.41	82	215.5	18.89	0	-	-	0	-	-	0	-	-	196	251.2	15.86
Jun 28-Jul 4	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-	88	235.3	21.06
TOTAL	425			340			166			44			134			695		
Alewife																		
May 3-9	-	-	-	100	272.1	12.50	100	279.0	11.43	99	280.9	14.02	100	282.6	16.37	0	-	-
May 10-16	99	285.2	15.83	100	273.3	12.63	100	277.9	13.64	100	274.5	13.68	98	275.5	16.21	200	286.8	15.71
May 17-23	39	283.6	19.50	62	273.4	14.32	82	278.5	12.55	100	272.7	17.38	100	272.8	17.70	200	276.6	14.13
May 24-30	2	265.0	28.28	43	267.4	13.57	53	280.1	14.51	91	269.3	16.85	64	266.3	17.39	194	273.1	15.29
May 31-Jun 6	5	263.4	11.19	3	228.7	28.02	58	279.0	13.63	66	271.1	15.75	34	275.3	21.30	130	270.3	14.47
Jun 7-13	0	-	-	12	239.8	33.61	41	274.1	15.66	0	-	-	53	270.5	20.05	43	268.7	14.26
Jun 14-20	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-	22	261.9	15.51
Jun 21-27	0	-	-	16	244.5	22.18	0	-	-	0	-	-	0	-	-	4	268.3	19.12
Jun 28-Jul 4	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-	8	246.9	16.62
TOTAL	145			336			434			456			449			801		

TABLE 2. Length-frequency distribution of mature alewife, by sex and location, Saint John River, 1981.

Fork length (mm)	Kennebecasis Bay				Washademoak Lake				Grand Lake				Indian Lake				Oromocto River				Mactaquac Dam				All sites combined			
	Male		Female		Male		Female		Male		Female		Male		Female		Male		Female		Male		Female		Male		Female	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
180-189	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-
190-199	0	-	0	-	1	0.6	0	-	0	-	0	-	0	-	0	-	0	-	1	0.4	0	-	0	-	1	0.1	2	0.1
200-209	0	-	0	-	1	0.6	1	0.6	0	-	0	-	0	-	0	-	0	-	2	0.8	0	-	1	0.2	2	0.2	6	0.4
210-219	0	-	0	-	2	1.2	3	1.8	0	-	0	-	0	-	0	-	1	0.5	0	-	2	0.5	0	-	8	0.6	0	-
220-229	0	-	0	-	4	2.4	0	-	0	-	0	-	1	0.5	0	-	5	2.3	0	-	5	2.5	0	-	5	1.4	0	-	21	1.7	2	0.1
230-239	0	-	0	-	3	1.8	2	1.2	3	1.4	0	-	5	2.3	0	-	5	2.5	0	-	5	1.4	0	-	21	1.7	2	0.1
240-249	1	1.5	1	1.3	11	6.6	6	3.5	1	0.5	4	1.9	14	6.4	12	5.1	14	6.9	3	1.2	15	4.1	7	1.6	56	4.5	33	2.4
250-259	9	13.0	3	4.0	24	14.5	9	5.3	6	2.8	7	3.2	34	15.5	20	8.5	40	19.8	22	8.9	59	16.0	37	8.6	172	13.8	98	7.1
260-269	10	14.5	9	11.8	50	30.1	36	21.2	60	27.7	24	11.1	44	20.0	40	17.0	49	24.3	42	17.0	91	24.6	66	15.3	304	24.4	217	15.8
270-279	18	26.1	7	9.2	47	28.3	45	26.5	80	36.9	58	26.7	55	25.0	53	22.5	50	24.8	50	20.2	84	22.7	98	22.7	334	26.9	311	22.6
280-289	17	24.6	16	21.1	20	12.1	46	27.1	48	22.1	59	27.2	45	20.5	58	24.6	25	12.4	47	19.0	82	22.2	88	20.4	237	19.1	314	22.8
290-299	10	14.5	9	11.8	3	1.8	14	8.2	16	7.4	36	16.6	18	8.2	32	13.6	15	7.4	41	16.6	25	6.8	74	17.2	87	7.0	206	15.0
300-309	4	5.8	21	27.6	0	-	6	3.5	3	1.4	23	10.6	4	1.3	17	7.2	2	1.0	28	11.3	4	1.1	46	10.7	17	1.4	141	10.2
310-319	0	-	10	13.2	0	-	2	1.2	0	-	6	2.8	0	-	3	1.3	0	-	10	4.1	3	0.8	9	2.1	3	0.2	40	2.9
320-329	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	1	0.4	0	-	4	0.9	0	-	5	0.4
330-339	0	-	0	-	0	-	0	-	0	-	0	-	0	-	1	0.4	0	-	0	-	0	-	0	-	1	0.1	0	-
340-349	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	1	0.2	0	-	1	0.1
350-359	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	1	0.5	0	-	0	-	0	-	0	-	1	0.1
TOTALS	69		76		166		170		217		217		220		236		202		247		370		431		1244		1377	

TABLE 3. Length-frequency distribution of mature blueback herring, by sex and location, Saint John River, 1981.

Fork length (mm)	Kennebecasis Bay				Washademoak Lake				Grand Lake				Indian Lake				Oromocto River				Mactaquac Dam				All sites combined			
	Male		Female		Male		Female		Male		Female		Male		Female		Male		Female		Male		Female		Male		Female	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
180-189	0	-	0	-	3	1.4	1	0.8	0	-	0	-	0	-	0	-	0	-	0	-	1	0.3	0	-	4	0.5	1	0.1
190-199	5	2.9	1	0.4	15	7.1	0	-	0	-	0	-	0	-	0	-	0	-	0	-	3	0.9	0	-	23	2.6	1	0.1
200-209	6	3.5	3	1.2	29	13.7	3	2.3	0	-	0	-	0	-	0	-	0	-	0	-	9	2.7	1	0.3	44	5.0	7	0.8
210-219	8	4.7	4	1.6	39	18.4	14	10.9	6	8.3	0	-	2	7.4	0	-	3	5.3	0	-	12	3.6	4	1.1	70	8.0	22	2.4
220-229	6	3.5	6	2.4	33	15.6	19	14.8	8	11.1	7	7.5	6	22.2	1	5.9	7	12.3	1	1.3	35	10.4	13	3.6	95	10.9	47	5.1
230-239	10	5.9	10	3.9	39	18.4	28	21.9	20	27.8	19	20.2	9	33.3	3	17.7	8	14.0	10	13.0	52	15.4	29	8.1	138	15.8	99	10.7
240-249	25	14.6	7	2.8	28	13.2	30	23.4	14	19.4	22	23.4	7	25.9	3	17.7	15	26.3	14	18.2	81	24.0	51	14.3	170	19.4	127	13.7
250-259	44	25.7	25	9.8	14	6.6	14	10.9	15	20.8	21	22.3	1	3.7	3	17.7	9	15.8	22	28.6	83	24.6	109	30.5	166	19.0	194	20.9
260-269	45	26.3	68	26.8	9	4.3	11	8.6	9	12.5	13	13.8	2	7.4	5	29.4	4	7.0	15	19.5	44	13.1	72	20.1	113	12.9	184	19.8
270-279	18	10.5	69	27.2	3	1.4	6	4.7	0	-	6	6.4	0	-	2	11.8	9	15.8	10	13.0	16	4.8	47	13.1	46	5.3	140	15.1
280-289	4	2.3	40	15.8	0	-	2	1.6	0	-	5	5.3	0	-	0	-	2	3.5	1	1.3	1	0.3	20	5.6	7	0.8	68	7.3
290-299	0	-	15	5.9	0	-	0	-	0	-	0	-	0	-	0	-	0	-	4	5.2	0	-	10	2.8	0	-	29	3.1
300-309	0	-	5	2.0	0	-	0	-	0	-	1	1.1	0	-	0	-	0	-	0	-	0	-	2	0.6	0	-	8	0.9
310-319	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-
320-329	0	-	1	0.4	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	1	0.1
TOTALS	171		254		212		128		72		94		27		17		57		77		337		358		876		928	

TABLE 4. Observed length-frequency of alewife, by age-groups; sexes and locations combined, Saint John River, 1981.

Fork length (mm)	Age group 3	4	5	6	7	8	9	10	Totals
190-199	1								1
200-209									
210-219	2		1						3
220-229		5							5
230-239	1	13	4						18
240-249		36	30	1					67
250-259		64	101	28					193
260-269		55	221	63	4	2			345
270-279		15	244	131	32	6	2		430
280-289		4	101	111	64	36	5		321
290-299		1	13	44	73	35	11	3	180
300-309				8	23	30	10	4	75
310-319					5	9	4	2	20
320-329							1		1
330-339									
340-349							1		1
350-359			1						1
Totals	4	193	716	386	201	118	34	9	1,661
Percent	0.2	11.6	43.1	23.2	12.1	7.1	2.1	0.5	

TABLE 5-1. Observed length-frequency of alewife, by age groups, sexes combined, Kennebecasis Bay, 1981.

Fork length (mm)	Age group 3	4	5	6	7	8	9	10	Totals
240-249		2							2
250-259		2	6	1					9
260-269		1	7	2					10
270-279			5	6	2	1			14
280-289			2	6		7	2		17
290-299					3	4	2	1	10
300-309					1	4	1	1	7
310-319					1	2			3
Totals		5	20	15	7	18	5	2	72
Percent		6.9	27.8	20.8	9.7	25.0	6.9	2.8	

TABLE 5-2. Observed length-frequency of alewife, by age groups, sexes combined, Washademoak Lake, 1981.

Fork length (mm)	Age group 3	4	5	6	7	8	9	10	Totals
190-199	1								1
200-209									
210-219	1								1
220-229		1							1
230-239		4	1						5
240-249		4	3						7
250-259		7	7	5					19
260-269		10	35	8					53
270-279		2	32	10	3				47
280-289		1	15	15	2				33
290-299		1	4	3	1		1		10
300-309						1			1
310-319						1			1
Totals	2	30	97	41	6	2	1		179
Percent	1.1	16.8	54.2	22.9	3.4	1.1	0.6		

TABLE 5-3. Observed length-frequency of alewife, by age groups, sexes combined, Grand Lake, 1981.

Fork length (mm)	Age group 3	4	5	6	7	8	9	10	Totals
230-239		1							1
240-249		2	1						3
250-259		1	3	1					5
260-269		4	23	18	2				47
270-279			39	19	12	2	1		73
280-289			16	16	15	12	2		61
290-299				7	4	7	3	2	23
300-309				2	1	3	4	2	12
310-319							1		1
Totals		8	82	63	34	24	11	4	226
Percent		3.5	36.3	27.9	15.0	10.6	4.9	1.8	

TABLE 5-4. Observed length-frequency of alewife, by age groups, sexes combined, Indian Lake, 1981.

Fork length (mm)	Age group 3	4	5	6	7	8	9	10	Totals
220-229		1							1
230-239		3							3
240-249		6	7						13
250-259		14	11	2					27
260-269		8	17	9	1				35
270-279		3	34	24	2		1		64
280-289		1	6	22	8	4	1		42
290-299			1	8	8	5	1		23
300-309				2	3	3		1	9
310-319							1		1
Totals		36	76	67	22	12	4	1	218
Percent		16.5	34.9	30.7	10.1	5.5	1.8	0.5	

TABLE 5-5. Observed length-frequency of alewife, by age groups, sexes combined, Oromocto River, 1981.

Fork length (mm)	Age group 3	4	5	6	7	8	9	10	Totals
210-219	1								1
220-229									
230-239	1	2	1						4
240-249		8	3	1					12
250-259		14	13	5					32
260-269		11	34	9					54
270-279		5	27	23	2				57
280-289			8	8	9	1			26
290-299			2	7	14	7			30
300-309				1	6	6	1		14
310-319					2	2			4
320-329									
330-339									
340-349									
350-359			1						1
Totals	2	40	89	54	33	16	1		235
Percent	0.9	17.0	37.9	23.0	14.0	6.8	0.4		

TABLE 5-6. Observed length-frequency of alewife, by age groups, sexes combined, Mactaquac Dam, 1981.

Fork length (mm)	Age group 3	4	5	6	7	8	9	10	Totals
210-219			1						1
220-229		3							3
230-239		3	2						5
240-249		14	16						30
250-259		26	61	14					101
260-269		21	105	17	1	2			146
270-279		5	107	49	11	3			175
280-289		2	54	44	30	12			142
290-299			6	19	43	12	4		84
300-309				3	12	13	4		32
310-319					2	4	2	2	10
320-329							1		1
330-339									
340-349							1		1
Totals		74	352	146	99	46	12	2	731
Percent		10.1	48.2	20.0	13.5	6.3	1.6	0.3	

TABLE 6. Observed length-frequency of blueback herring, by age groups; sexes and locations combined, Saint John River, 1981.

Fork length (mm)	Age group 3	4	5	6	7	8	9	10	11	12	Totals
180-189	2										2
190-199	12	1									13
200-209	19	9									28
210-219	28	20	1								49
220-229	16	61	37	1							115
230-239	5	77	72	8	1	1					164
240-249		63	92	27	13	6	2				203
250-259		19	101	55	37	47	18	2	1	1	281
260-269		4	31	38	30	59	22	7	2		193
270-279			4	10	17	35	15	10	3	1	95
280-289				1	8	9	7	15	4		44
290-299						1	3	3	7		14
300-309							1				1
310-319										1	1
Totals	82	254	338	140	106	158	68	37	17	3	1,203
Percent	6.8	21.1	28.1	11.6	8.8	13.1	5.6	3.1	1.4	0.3	

TABLE 7-1. Observed length-frequency of blueback herring, by age groups, sexes combined, Kennebecasis Bay, 1981.

Fork length (mm)	Age group 3	4	5	6	7	8	9	10	11	12	Totals
190-199	1										1
200-209	1										1
210-219		3									3
220-229		3	1								4
230-239		2	1	1							4
240-249			4	2	5	4	1				16
250-259			3	9	11	22	4				49
260-269			2	5	10	29	9	5			60
270-279					5	17	7	7	3	1	40
280-289					2	2	1	11	3		19
290-299								2	3		5
300-309							1				1
310-319										1	1
Totals	2	8	11	17	33	74	23	25	9	2	204
Percent	1.0	3.9	5.4	8.3	16.2	36.3	11.3	12.3	4.4	1.0	

TABLE 7-2. Observed length-frequency of blueback herring, by age groups, sexes combined, Washademoak Lake, 1981.

Fork length (mm)	Age group 3	4	5	6	7	8	9	10	11	12	Totals
180-189	1										1
190-199	8										8
200-209	13	1									14
210-219	17	6									23
220-229	9	15	2								26
230-239	1	26	9			1					37
240-249		13	8	2							23
250-259		6	8	2	2	1					19
260-269			2	1	5	1	2				11
270-279			1	1	2	1					5
280-289						1					1
Totals	49	67	30	6	9	5	2				168
Percent	29.2	39.9	17.9	3.6	5.4	3.0	1.2				

TABLE 7-3. Observed length-frequency of blueback herring, by age groups, sexes combined, Grand Lake, 1981.

Fork length (mm)	Age group 3	4	5	6	7	8	9	10	11	12	Totals
210-219	2	1									3
220-229	2	3	1								6
230-239	1	10	2								13
240-249		11	3	1		1					16
250-259		2	7	5	1						15
260-269		1	2	3	2	1					9
270-279						1					1
280-289					3						3
Totals	5	28	15	9	6	3					66
Percent	7.6	42.4	22.7	13.6	9.1	4.6					

TABLE 7-4. Observed length-frequency of blueback herring, by age groups, sexes combined, Indian Lake, 1981.

Fork length (mm)	Age group 3	4	5	6	7	8	9	10	11	12	Totals
210-219	1										1
220-229	1	8									9
230-239		5	2								7
240-249		4	1	1							6
250-259											
260-269				2							2
270-279					1						1
Totals	2	17	3	3	1						26
Percent	7.7	65.4	11.5	11.5	3.9						

TABLE 7-5. Observed length-frequency of blueback herring, by age groups, sexes combined, Oromocto River, 1981.

Fork length (mm)	Age group 3	4	5	6	7	8	9	10	11	12	Totals
200-209	1										1
210-219	1	1									2
220-229	2	7	3								12
230-239	1	7	5								13
240-249		9	2	1							12
250-259		1	5		1						7
260-269		1	2		3	2					8
270-279						2					2
280-289						1	1				2
Totals	5	26	17	1	4	5	1				59
Percent	8.5	44.1	28.8	1.7	6.8	8.5	1.7				

TABLE 7-6. Observed length-frequency of blueback herring, by age groups, sexes combined, Mactaquac Dam, 1981.

Fork length (mm)	Age group 3	4	5	6	7	8	9	10	11	12	Totals
180-189	1										1
190-199	3	1									4
200-209	4	8									12
210-219	7	9									16
220-229	2	25	30	1							58
230-239	2	27	53	7	1						90
240-249		26	74	20	8	1	1				130
250-259		10	78	39	22	24	14	2	1	1	191
260-269		2	23	27	10	26	11	2	2		103
270-279			3	9	9	14	8	3			46
280-289				1	3	5	5	4	1		19
290-299						1	3	1	4		9
300-309							1				1
Totals	19	108	261	104	53	71	43	12	8	1	680
Percent	2.8	15.9	38.4	15.3	7.8	10.4	6.3	1.8	1.2	0.2	

TABLE 8. Observed length-frequency of gaspereau, by age groups; sexes, species and locations combined, Saint John River, 1981.

Fork length (mm)	Age group 3	4	5	6	7	8	9	10	11	12	Totals
180-189	2										2
190-199	13	1									14
200-209	19	9									28
210-219	30	20	2								52
220-229	16	66	37	1							120
230-239	6	90	76	8	1	1					182
240-249		99	122	28	13	6	2				270
250-259		83	202	83	37	47	18	2	1	1	474
260-269		59	252	101	34	61	22	7	2		538
270-279		15	248	141	49	41	17	10	3	1	525
280-289		4	101	112	72	45	12	15	4		365
290-299		1	13	44	73	36	14	6	7		194
300-309				8	23	30	11	4			76
310-319					5	9	4	2		1	21
320-329							1				1
330-339											
340-349							1				1
350-359			1								1
Totals	86	447	1,054	526	307	276	102	46	17	3	2,864
Percent	3.0	15.6	36.8	18.4	10.7	9.6	3.6	1.6	0.6	0.1	

TABLE 9-1. Observed length-frequency of gaspereau, by age groups; species and sexes combined, Kennebecasis Bay, 1981.

Fork length (mm)	Age group										
	3	4	5	6	7	8	9	10	11	12	Totals
190-199	1										1
200-209	1										1
210-219		3									3
220-229		3	1								4
230-239		2	1	1							4
240-249		2	4	2	5	4	1				18
250-259		2	9	10	11	22	4				58
260-269		1	9	7	10	29	9	5			70
270-279			5	6	7	18	7	7	3	1	54
280-289			2	6	2	9	3	11	3		36
290-299					3	4	2	3	3		15
300-309					1	4	2	1			8
310-319					1	2				1	4
Totals	2	13	31	32	40	92	28	27	9	2	276
Percent	0.7	4.7	11.2	11.6	14.5	33.3	10.1	9.8	3.3	0.7	

TABLE 9-2. Observed length-frequency of gaspereau, by age groups; species and sexes combined, Washademoak Lake, 1981.

Fork length (mm)	Age group										
	3	4	5	6	7	8	9	10	11	12	Totals
180-189	1										1
190-199	9										9
200-209	13	1									14
210-219	18	6									24
220-229	9	16	2								27
230-239	1	30	10			1					42
240-249		17	11	2							30
250-259		13	15	7	2	1					38
260-269		10	37	9	5	1	2				64
270-279		2	33	11	5	1					52
280-289		1	15	15	2	1					34
290-299		1	4	3	1		1				10
300-309						1					1
310-319						1					1
Totals	51	97	127	47	15	7	3				347
Percent	14.7	28.0	36.6	13.5	4.3	2.0	0.9				

TABLE 9-3. Observed length-frequency of gaspereau, by age groups; species and sexes combined, Grand Lake, 1981.

Fork length (mm)	Age group										
	3	4	5	6	7	8	9	10	11	12	Totals
210-219	2	1									3
220-229	2	3	1								6
230-239	1	11	2								14
240-249		13	4	1		1					19
250-259		3	10	6	1						20
260-269		5	25	21	4	1					56
270-279			39	19	12	3	1				74
280-289			16	16	18	12	2				64
290-299				7	4	7	3	2			23
300-309				2	1	3	4	2			12
310-319							1				1
Totals	5	36	97	72	40	27	11	4			292
Percent	1.7	12.3	33.2	24.7	13.7	9.3	3.8	1.4			

TABLE 9-4. Observed length-frequency of gaspereau, by age groups; species and sexes combined, Indian Lake, 1981.

Fork length (mm)	Age group										Totals
	3	4	5	6	7	8	9	10	11	12	
210-219	1										1
220-229	1	9									10
230-239		8	2								10
240-249		10	8	1							19
250-259		14	11	2							27
260-269		8	17	11	1						37
270-279		3	34	24	3		1				65
280-289		1	6	22	8	4	1				42
290-299			1	8	8	5	1				23
300-309				2	3	3		1			9
310-319							1				1
Totals	2	53	79	70	23	12	4	1			244
Percent	0.8	21.7	32.4	28.7	9.4	4.9	1.6	0.4			

TABLE 9-5. Observed length-frequency of gaspereau, by age groups; species and sexes combined, Oromocto River, 1981.

Fork length (mm)	Age group										Totals
	3	4	5	6	7	8	9	10	11	12	
200-209	1										1
210-219	2	1									3
220-229	2	7	3								12
230-239	2	9	6								17
240-249		17	5	2							24
250-259		15	18	5	1						39
260-269		12	36	9	3	2					62
270-279		5	27	23	2	2					59
280-289			8	8	9	2	1				28
290-299			2	7	14	7					30
300-309				1	6	6	1				14
310-319					2	2					4
320-329											
330-339											
340-349											
350-359			1								1
Totals	7	66	106	55	37	21	2				294
Percent	2.4	22.5	36.1	18.7	12.6	7.1	0.7				

TABLE 9-6. Observed length-frequency of gaspereau, by age groups; species and sexes combined, Mactaquac Dam, 1981.

Fork length (mm)	Age group 3	4	5	6	7	8	9	10	11	12	Totals
180-189	1										1
190-199	3	1									4
200-209	4	8									12
210-219	7	9	1								17
220-229	2	28	30	1							61
230-239	2	30	55	7	1						95
240-249		40	90	20	8	1	1				160
250-259		36	139	53	22	24	14	2	1	1	292
260-269		23	128	44	11	28	11	2	2		249
270-279		5	110	58	20	17	8	3			221
280-289		2	54	45	33	17	5	4	1		161
290-299			6	19	43	13	7	1	4		93
300-309				3	12	13	5				33
310-319					2	4	2	2			10
320-329							1				1
330-339											
340-349							1				1
Totals	19	182	613	250	152	117	55	14	8	1	1,411
Percent	1.4	12.9	43.4	17.7	10.8	8.3	3.9	1.0	0.6	0.1	

TABLE 10-1. Mean fork lengths of alewife, by sex and age, Kennebecasis Bay, 1981.

Age	Male No. of fish	Male Length (mm) Mean	Male Length (mm) Range	Male Length (mm) SD	Female No. of fish	Female Length (mm) Mean	Female Length (mm) Range	Female Length (mm) SD
4	3	255.3	250-263	6.81	2	249.5	245-254	6.36
5	12	265.2	255-279	7.90	8	272.0	258-285	10.34
6	12	273.8	255-289	9.70	3	287.0	284-289	2.65
7	2	286.0	278-294	11.31	5	298.6	277-312	13.03
8	6	287.0	283-290	2.83	12	299.4	278-314	9.66
9	3	291.7	288-297	4.73	2	302.0	297-307	7.07
10	0	-	-	-	2	302.5	300-305	3.54

TABLE 10-2. Mean fork lengths of alewife, by sex and age, Washademoak Lake, 1981.

Age	Male No. of fish	Male Length (mm) Mean	Male Length (mm) Range	Male Length (mm) SD	Female No. of fish	Female Length (mm) Mean	Female Length (mm) Range	Female Length (mm) SD
3	1	191.0	191-191	0.00	1	218.0	218-218	0.00
4	16	255.9	236-270	10.98	14	259.9	230-294	19.00
5	45	268.0	244-288	10.25	52	274.9	239-295	10.76
6	20	271.4	253-294	11.01	21	279.8	264-292	9.36
7	4	278.3	274-284	4.19	2	292.0	288-296	5.66
8	0	-	-	-	2	307.0	302-312	7.07
9	0	-	-	-	1	300.0	300-300	0.00

TABLE 10-3. Mean fork lengths of alewife, by sex and age, Grand Lake, 1981.

	Male				Female			
	No. of	Length (mm)			No. of	Length (mm)		
Age	fish	Mean	Range	SD	fish	Mean	Range	SD
4	5	254.4	234-266	14.88	3	255.3	247-263	8.02
5	44	271.7	254-289	7.31	38	275.3	249-286	8.07
6	31	273.2	254-293	8.43	32	283.5	265-302	10.69
7	20	280.4	265-294	7.46	14	288.6	275-308	8.20
8	11	286.7	277-293	5.00	13	293.3	283-305	7.75
9	5	291.2	277-309	11.50	6	304.5	290-316	9.23
10	0	-	-	-	4	302.3	293-310	8.10

TABLE 10-4. Mean fork lengths of alewife, by sex and age, Indian Lake, 1981.

	Male				Female			
	No. of	Length (mm)			No. of	Length (mm)		
Age	fish	Mean	Range	SD	fish	Mean	Range	SD
4	25	253.8	229-272	11.26	11	261.7	246-281	12.33
5	29	266.0	243-286	10.86	47	271.5	245-291	10.26
6	31	277.0	260-295	8.43	36	283.8	260-308	10.75
7	9	287.4	266-301	10.45	13	290.9	275-305	9.32
8	6	289.8	285-295	3.49	6	299.7	290-305	5.75
9	2	283.5	280-287	4.95	2	305.0	298-312	9.90
10	0	-	-	-	1	304.0	304-304	0.00

TABLE 10-5. Mean fork lengths of alewife, by sex and age, Oromocto River, 1981.

	Male				Female			
	No. of	Length (mm)			No. of	Length (mm)		
Age	fish	Mean	Range	SD	fish	Mean	Range	SD
3	1	237.0	237-237	0.00	1	216.0	216-216	0.00
4	17	252.8	235-238	9.55	23	263.1	247-276	7.78
5	44	266.6	232-358	16.90	45	273.0	252-298	10.06
6	24	274.2	248-296	10.89	30	278.5	256-302	11.26
7	10	284.4	276-292	5.44	23	298.5	285-312	7.41
8	3	291.3	285-296	6.69	13	302.6	291-317	7.56
9	0	-	-	-	1	306.0	306-306	0.00
10	0	-	-	-	0	-	-	-

TABLE 10-6. Mean fork lengths of alewife, by sex and age, Mactaquac Dam, 1981.

	Male				Female			
	No. of	Length (mm)			No. of	Length (mm)		
Age	fish	Mean	Range	SD	fish	Mean	Range	SD
4	38	254.1	222-276	13.19	36	260.1	240-289	10.42
5	172	265.8	231-291	11.02	180	272.5	213-297	11.19
6	58	273.2	252-297	11.16	88	282.2	254-304	11.23
7	45	286.1	269-302	7.41	54	296.2	273-313	7.84
8	18	287.9	267-311	11.60	28	300.3	279-320	9.97
9	2	291.5	291-292	0.71	10	310.4	294-341	14.47
10	0	-	-	-	2	316.0	312-320	5.66

TABLE 11. Summary of mean fork lengths of alewife, by sex and age, by location, Saint John River, 1981.

Age	Kennebecasis Bay		Washademoak Lake		Grand Lake		Indian Lake		Oromocto River		Mactaquac Dam	
	Mean length (mm)	No. of fish	Mean length (mm)	No. of fish	Mean length (mm)	No. of fish	Mean length (mm)	No. of fish	Mean length (mm)	No. of fish	Mean length (mm)	No. of fish
Male												
3	-	0	191.0	1	-	0	-	0	237.0	1	-	0
4	255.3	3	255.9	16	254.4	5	253.8	25	252.8	17	254.1	38
5	265.2	12	268.0	45	271.7	44	266.0	29	266.6	44	265.8	172
6	273.8	12	271.4	20	273.2	31	277.0	31	274.2	24	273.2	58
7	286.0	2	278.3	4	280.4	20	287.4	9	284.4	10	286.1	45
8	287.0	6	-	0	286.7	11	289.8	6	291.3	3	287.9	18
9	291.7	3	-	0	291.2	5	283.5	2	-	0	291.5	2
Female												
3	-	0	218.0	1	-	0	-	0	216.0	1	-	0
4	249.5	2	259.9	14	255.3	3	261.7	11	263.1	23	260.1	36
5	272.0	8	274.9	52	275.3	38	271.5	47	273.0	45	272.5	180
6	287.0	3	279.8	21	283.5	32	283.8	36	278.5	30	282.2	88
7	298.6	5	292.0	2	288.6	14	290.9	13	298.5	23	296.2	54
8	299.4	12	307.0	2	293.3	13	299.7	6	302.6	13	300.3	28
9	302.0	2	300.0	1	304.5	6	305.0	2	306.0	1	310.4	10
10	302.5	2	-	0	302.3	4	304.0	1	-	0	316.0	2

TABLE 12-1. Mean fork lengths of blueback herring, by sex and age, Kennebecasis Bay, 1981.

Age	Male				Female			
	No. of fish	Length (mm)			No. of fish	Length (mm)		
		Mean	Range	SD		Mean	Range	SD
3	2	201.0	197-205	5.66	0	-	-	-
4	5	224.0	218-235	7.04	3	230.7	226-240	8.08
5	5	247.4	236-261	9.58	6	249.8	229-261	11.65
6	8	250.4	238-257	7.15	9	261.3	256-270	4.18
7	17	256.9	245-274	8.87	16	268.7	251-287	9.86
8	32	259.7	247-275	6.44	42	268.7	252-287	7.55
9	9	263.8	246-279	8.80	14	273.9	260-304	11.73
10	5	271.6	265-281	6.03	20	282.3	265-295	9.12

TABLE 12-2. Mean fork lengths of blueback herring, by sex and age, Washademoak Lake, 1981.

Age	Male				Female			
	No. of fish	Length (mm)			No. of fish	Length (mm)		
		Mean	Range	SD		Mean	Range	SD
3	38	208.8	188-228	9.39	11	220.6	203-236	10.02
4	39	233.0	205-256	10.69	28	237.3	211-260	11.86
5	17	243.8	230-262	9.67	13	248.5	229-275	13.41
6	3	247.0	241-252	5.57	3	265.7	253-277	12.06
7	5	263.6	258-274	6.35	4	267.8	261-278	7.41
8	2	248.5	240-257	12.02	3	275.7	261-288	13.65
9	2	266.0	263-269	4.24	0	-	-	-
10	0	-	-	-	0	-	-	-

TABLE 12-3 Mean fork lengths of blueback herring, by sex and age, Grand Lake, 1981.

	Male				Female			
	No. of	Length (mm)			No. of	Length (mm)		
Age	fish	Mean	Range	SD	fish	Mean	Range	SD
3	4	220.8	215-232	8.02	1	224.0	224-224	0.00
4	10	235.5	219-248	8.66	18	243.6	224-268	10.72
5	8	244.5	223-259	11.39	7	257.4	242-268	8.83
6	4	254.5	245-261	7.51	5	259.2	254-263	3.70
7	0	-	-	-	6	275.8	259-289	11.37
8	2	251.5	241-262	14.85	1	280.0	280-280	0.00
9	0	-	-	-	0	-	-	-
10	0	-	-	-	0	-	-	-

TABLE 12-4. Mean fork lengths of blueback herring, by sex and age, Indian Lake, 1981.

	Male				Female			
	No. of	Length (mm)			No. of	Length (mm)		
Age	fish	Mean	Range	SD	fish	Mean	Range	SD
3	2	223.5	217-230	9.19	0	-	-	-
4	12	232.3	222-245	7.38	5	237.6	225-247	8.41
5	3	238.3	235-245	5.77	0	-	-	-
6	2	255.5	250-261	7.78	1	264.0	264-264	0.00
7	0	-	-	-	1	273.0	273-273	0.00
8	0	-	-	-	0	-	-	-
9	0	-	-	-	0	-	-	-
10	0	-	-	-	0	-	-	-

TABLE 12-5. Mean fork lengths of blueback herring, by sex and age, Oromocto River, 1981.

	Male				Female			
	No. of	Length (mm)			No. of	Length (mm)		
Age	fish	Mean	Range	SD	fish	Mean	Range	SD
3	4	222.5	208-235	11.68	1	225.0	225-225	0.00
4	11	232.5	222-249	7.85	15	243.5	220-265	12.11
5	4	248.5	235-263	15.07	13	243.0	223-264	12.48
6	0	-	-	-	1	250.0	250-250	0.00
7	4	263.8	257-270	5.85	0	-	-	-
8	2	267.5	265-270	3.54	3	280.7	276-286	5.03
9	0	-	-	-	1	283.0	283-283	0.00
10	0	-	-	-	0	-	-	-

TABLE 12-6. Mean fork lengths of blueback herring, by sex and age, Mactaquac Dam, 1981.

	Male				Female			
	No. of	Length (mm)			No. of	Length (mm)		
Age	fish	Mean	Range	SD	fish	Mean	Range	SD
3	15	208.2	187-227	10.08	4	227.0	214-237	10.92
4	59	228.2	198-254	12.39	49	240.2	206-261	13.45
5	115	241.2	221-275	10.35	146	251.0	221-272	11.26
6	38	248.6	230-273	9.92	66	261.0	243-282	8.07
7	31	256.4	240-274	7.65	22	268.8	250-285	9.55
8	40	262.0	249-287	7.67	31	271.1	255-292	9.85
9	23	259.9	245-278	5.96	20	278.8	257-304	11.48
10	4	261.3	253-270	6.99	8	283.9	275-294	6.71

TABLE 13. Summary of mean fork lengths of blueback herring, by sex and age, by location, Saint John River, 1981.

Age	Kennebecasis Bay		Washademoak Lake		Grand Lake		Indian Lake		Oromocto River		Mactaquac Dam	
	Mean length (mm)	No. of fish	Mean length (mm)	No. of fish	Mean length (mm)	No. of fish	Mean length (mm)	No. of fish	Mean length (mm)	No. of fish	Mean length (mm)	No. of fish
Male												
3	201.0	2	208.8	38	220.8	4	223.5	2	222.5	4	208.2	15
4	224.0	5	233.0	39	235.5	10	232.3	12	232.5	11	228.2	59
5	247.4	5	243.8	17	244.5	8	238.3	3	248.5	4	241.2	115
6	250.4	8	247.0	3	254.5	4	255.5	2	-	0	248.6	38
7	256.9	17	263.6	5	-	0	-	0	263.8	4	256.4	31
8	259.7	32	248.5	2	251.5	2	-	0	267.5	2	262.0	40
9	263.8	9	266.0	2	-	0	-	0	-	0	259.9	23
10	271.6	5	-	0	-	0	-	0	-	0	261.3	4
Female												
3	-	0	220.6	11	224.0	1	-	0	225.0	1	227.0	4
4	230.7	3	237.3	28	243.6	18	237.6	5	243.5	15	240.2	49
5	249.8	6	248.5	13	257.4	7	-	0	243.0	13	251.0	146
6	261.3	9	265.7	3	259.2	5	264.0	1	250.0	1	261.0	66
7	268.7	16	267.8	4	275.8	6	273.0	1	-	0	268.8	22
8	268.7	42	275.7	3	280.0	1	-	0	280.7	3	271.1	31
9	273.9	14	-	0	-	0	-	0	283.0	1	278.8	20
10	282.3	20	-	0	-	0	-	0	-	0	283.9	8

TABLE 14-1. Mean weights of alewife, by sex and age, Kennebecasis Bay, 1981.

Age	Male				Female			
	No. of fish	Weight (g)			No. of fish	Weight (g)		
		Mean	Range	SD		Mean	Range	SD
3	0	-	-	-	0	-	-	-
4	3	201.3	196-208	6.11	2	191.0	176-206	21.21
5	12	226.3	190-274	23.80	8	254.4	208-286	28.21
6	12	248.4	202-301	28.51	3	290.3	269-305	18.90
7	2	279.0	226-332	74.95	5	304.0	254-346	35.16
8	6	284.8	255-344	31.20	12	326.2	295-411	34.76
9	3	307.3	296-326	16.29	2	362.0	356-368	8.49
10	0	-	-	-	2	325.0	306-344	26.87

TABLE 14-2. Mean weights of alewife, by sex and age, Washademoak Lake, 1981.

Age	Male				Female			
	No. of fish	Weight (g)			No. of fish	Weight (g)		
		Mean	Range	SD		Mean	Range	SD
3	1	87.0	87-87	0.00	1	131.0	131-131	0.00
4	16	216.2	161-255	28.78	14	234.0	151-329	54.97
5	45	252.0	181-325	31.52	52	273.6	182-369	43.70
6	20	260.2	203-317	33.25	21	300.5	229-362	38.14
7	4	278.8	269-302	15.65	2	401.0	345-457	79.20
8	0	-	-	-	2	357.0	333-381	33.94
9	0	-	-	-	1	285.0	285-285	0.00
10	0	-	-	-	0	-	-	-

TABLE 14-3. Mean weights of alewife, by sex and age, Grand Lake, 1981.

	Male				Female			
	No. of	Weight (g)			No. of	Weight (g)		
Age	fish	Mean	Range	SD	fish	Mean	Range	SD
4	5	197.2	170-221	24.59	3	218.3	206-233	13.65
5	44	261.5	213-311	23.75	38	271.7	216-338	31.88
6	31	266.5	217-369	33.58	32	299.8	235-422	42.82
7	20	284.4	248-351	23.36	14	312.3	262-387	38.43
8	11	295.7	246-315	21.62	13	323.6	244-373	42.76
9	5	306.8	271-333	27.26	6	375.0	287-480	83.32
10	0	-	-	-	4	338.0	301-433	63.70

TABLE 14-4. Mean weights of alewife, by sex and age, Indian Lake, 1981.

	Male				Female			
	No. of	Weight (g)			No. of	Weight (g)		
Age	fish	Mean	Range	SD	fish	Mean	Range	SD
4	25	208.5	169-257	22.67	11	228.2	178-320	42.22
5	29	233.7	162-352	40.19	47	252.6	167-326	37.41
6	31	258.0	218-356	30.16	36	287.6	199-449	50.48
7	9	288.1	220-336	.06	13	298.2	235-361	34.96
8	6	303.3	280-330	16.53	6	311.7	262-365	34.24
9	2	282.5	260-305	31.82	2	309.5	306-313	4.95
10	0	-	-	-	1	321.0	321-321	0.00

TABLE 14-5. Mean weights of alewife, by sex and age, Oromocto River, 1981.

	Male				Female			
	No. of	Weight (g)			No. of	Weight (g)		
Age	fish	Mean	Range	SD	fish	Mean	Range	SD
3	1	191.0	191-191	0.00	1	144.0	144-144	0.00
4	17	213.5	180-282	27.97	23	242.9	167-472	58.85
5	44	233.5	165-295	34.25	45	274.4	189-404	51.06
6	24	276.1	199-372	47.50	30	283.9	216-418	53.81
7	10	307.6	275-369	32.66	23	350.3	244-453	66.89
8	3	326.0	263-362	54.75	13	377.5	266-450	53.74
9	0	-	-	-	1	298.0	298-298	0.00
10	0	-	-	-	0	-	-	-

TABLE 14-6. Mean weights of alewife, by sex and age, Mactaquac Dam, 1981.

	Male				Female			
	No. of	Weight (g)			No. of	Weight (g)		
Age	fish	Mean	Range	SD	fish	Mean	Range	SD
4	38	216.2	140-277	28.73	36	248.5	193-352	35.76
5	172	252.3	168-339	36.76	180	288.2	193-376	38.38
6	58	273.2	193-398	39.67	88	317.0	208-401	41.34
7	45	307.2	226-388	32.05	54	368.2	292-473	36.23
8	18	316.8	241-433	45.23	28	382.2	303-492	49.84
9	2	337.5	331-334	9.19	10	401.7	335-499	53.99
10	0	-	-	-	2	441.5	395-488	65.76

TABLE 15. Summary of mean weights of alewife, by sex and age, by location, Saint John River, 1981.

Age	Kennebecasis Bay		Washademoak Lake		Grand Lake		Indian Lake		Oromocto River		Mactaquac Dam	
	Mean weight (g)	No. of fish	Mean weight (g)	No. of fish	Mean weight (g)	No. of fish	Mean weight (g)	No. of fish	Mean weight (g)	No. of fish	Mean weight (g)	No. of fish
Male												
3	-	0	87.0	1	-	0	-	0	191.0	1	-	0
4	201.3	3	216.2	16	197.2	5	208.5	25	213.5	17	216.2	38
5	226.3	12	252.0	45	261.5	44	233.7	29	233.5	44	252.3	172
6	248.4	12	260.2	20	266.5	31	258.0	31	276.1	24	273.2	58
7	279.0	2	278.8	4	284.4	20	288.1	9	307.6	10	307.2	45
8	284.8	6	-	0	295.7	11	303.3	6	326.0	3	316.8	18
9	307.3	3	-	0	306.8	5	282.5	2	-	0	337.5	2
Female												
3	-	0	131.0	1	-	0	-	0	144.0	1	-	0
4	191.0	2	234.0	14	218.3	3	228.2	11	242.9	23	248.5	36
5	254.4	8	273.6	52	271.7	38	252.6	47	274.4	45	288.2	180
6	290.3	3	300.5	21	299.8	32	287.6	36	283.9	30	317.0	88
7	304.0	5	401.0	2	312.3	14	298.2	13	350.3	23	368.2	54
8	326.2	12	357.0	2	323.6	13	311.7	6	377.5	13	382.2	28
9	362.0	2	285.0	1	375.0	6	309.5	2	298.0	1	401.7	10
10	325.0	2	-	0	338.0	4	321.0	1	-	0	441.5	2

TABLE 16-1. Mean weights of blueback herring, by sex and age, Kennebecasis Bay, 1981.

Age	Male				Female			
	No. of fish	Weight (g)			No. of fish	Weight (g)		
		Mean	Range	SD		Mean	Range	SD
3	2	100.5	90-111	14.85	0	-	-	-
4	5	134.6	116-161	20.55	3	149.3	128-191	36.09
5	5	182.6	133-237	39.63	6	208.0	134-259	50.02
6	8	195.4	157-233	29.36	9	243.8	168-297	47.33
7	17	218.4	174-276	33.61	16	240.4	167-363	53.55
8	32	230.3	167-286	29.05	42	251.4	190-368	44.96
9	9	235.0	171-276	30.10	14	276.8	196-398	54.32
10	5	276.4	217-316	40.83	20	297.2	196-424	65.51

TABLE 16-2. Mean weights of blueback herring, by sex and age, Washademoak Lake, 1981.

Age	Male				Female			
	No. of fish	Weight (g)			No. of fish	Weight (g)		
		Mean	Range	SD		Mean	Range	SD
3	38	111.3	73-160	19.76	10	135.9	89-166	23.76
4	39	162.3	103-224	26.37	28	172.8	114-257	32.01
5	17	188.4	143-232	25.87	13	208.4	155-275	39.98
6	3	201.0	171-227	28.21	3	267.0	240-298	29.21
7	5	247.0	208-291	33.41	4	244.8	185-314	57.36
8	2	217.5	205-230	17.68	3	263.0	175-344	84.72
9	2	269.0	269-269	-	0	-	-	-

TABLE 16-3. Mean weights of blueback herring, by sex and age, Grand Lake, 1981.

Age	Male				Female			
	No. of fish	Weight (g)			No. of fish	Weight (g)		
		Mean	Range	SD		Mean	Range	SD
3	4	135.8	112-151	18.93	1	153.0	153-153	0.00
4	10	164.1	119-198	21.43	18	189.4	155-229	21.25
5	8	185.6	144-219	29.08	7	216.1	188-247	23.79
6	4	226.3	206-253	23.51	5	223.2	197-244	16.90
7	0	-	-	-	6	281.5	227-390	61.55
8	2	220.0	202-238	25.46	1	312.0	312-312	0.00

TABLE 16-4. Mean weights of blueback herring, by sex and age, Indian Lake, 1981.

Age	Male				Female			
	No. of fish	Weight (g)			No. of fish	Weight (g)		
		Mean	Range	SD		Mean	Range	SD
3	2	136.5	130-143	9.19	0	-	-	-
4	12	167.4	142-197	17.04	5	181.8	164-205	17.08
5	3	181.7	156-200	22.90	0	-	-	-
6	2	224.5	199-250	36.06	1	245.0	245-245	0.00
7	0	-	-	-	1	300.0	300-300	0.00

TABLE 16-5. Mean weights of blueback herring, by sex and age, Oromocto River, 1981.

Age	Male				Female			
	No. of fish	Weight (g)			No. of fish	Weight (g)		
		Mean	Range	SD		Mean	Range	SD
3	4	137.5	114-153	17.41	1	137.0	137-137	0.00
4	11	160.6	138-199	20.47	15	178.5	137-225	31.07
5	4	195.3	146-249	43.87	13	192.2	161-238	26.52
6	0	-	-	-	1	178.0	178-178	0.00
7	4	221.3	196-237	17.63	0	-	-	-
8	2	265.0	264-266	1.41	3	305.3	285-337	27.79
9	0	-	-	-	1	288.0	288-288	0.00

TABLE 16-6. Mean weights of blueback herring, by sex and age, Mactaquac Dam, 1981.

Age	Male				Female			
	No. of fish	Weight (g)			No. of fish	Weight (g)		
		Mean	Range	SD		Mean	Range	SD
3	15	110.1	72-159	21.64	4	147.5	115-171	23.80
4	59	147.1	95-204	25.76	49	178.6	101-286	36.37
5	115	177.0	129-305	28.51	146	207.8	133-289	34.13
6	38	198.5	139-270	25.49	66	242.2	183-334	31.55
7	31	216.7	171-292	24.14	22	266.8	197-318	31.28
8	40	238.1	178-322	30.55	31	274.7	225-353	31.03
9	23	226.3	183-262	22.29	20	299.5	239-360	38.52
10	4	250.5	222-277	30.64	8	319.3	296-361	25.88

TABLE 17. Summary of mean weights of blueback herring, by sex and age, by location, Saint John River, 1981.

Age	Kennebecasis Bay		Washademoak Lake		Grand Lake		Indian Lake		Oromocto River		Mactaquac Dam	
	Mean weight (g)	No. of fish	Mean weight (g)	No. of fish	Mean weight (g)	No. of fish	Mean weight (g)	No. of fish	Mean weight (g)	No. of fish	Mean weight (g)	No. of fish
Male												
3	100.5	2	111.3	38	135.8	4	136.5	2	137.5	4	110.1	15
4	134.6	5	162.3	39	164.1	10	167.4	12	160.6	11	147.1	59
5	182.6	5	188.4	17	185.6	8	181.7	3	195.3	4	177.0	115
6	195.4	8	201.0	3	226.3	4	224.5	2	-	0	198.5	38
7	218.4	17	247.0	5	-	0	-	0	221.3	4	216.7	31
8	230.3	32	217.5	2	220.0	2	-	0	265.0	2	238.1	40
9	235.0	9	269.0	2	-	0	-	0	-	0	226.3	23
10	276.4	5	-	0	-	0	-	0	-	0	250.5	4
Female												
3	-	0	135.9	10	153.0	1	-	0	137.0	1	147.5	4
4	149.3	3	172.8	28	189.4	18	181.8	5	178.5	15	178.6	49
5	208.0	6	208.4	13	216.1	7	-	0	192.2	13	207.8	146
6	243.8	9	267.0	3	223.2	5	245.0	1	178.0	1	242.2	66
7	240.4	16	244.8	4	281.5	6	300.0	1	-	0	266.8	22
8	251.4	42	263.0	3	312.0	1	-	0	305.3	3	274.7	31
9	276.8	14	-	0	-	0	-	0	288.0	1	299.5	20
10	297.2	20	-	0	-	0	-	0	-	0	319.3	8

TABLE 18. Spawning history of alewife, by sex and location, Saint John River, 1981.

No. previous spawnings	Kennebecasis Bay			Washademoak Lake			Grand Lake			Indian Lake			Oromocto River			Mactaquac Dam		
	No.	%	Mean age	No.	%	Mean age	No.	%	Mean age	No.	%	Mean age	No.	%	Mean age	No.	%	Mean age
Male																		
0	10	26.3	4.9	36	41.9	4.8	24	20.7	5.0	30	29.4	4.4	43	43.4	4.8	170	51.1	4.9
1	6	15.8	5.3	17	19.8	5.2	18	15.5	5.4	32	31.4	5.4	21	21.2	5.1	50	15.0	5.2
2	7	18.4	5.6	20	23.3	5.3	39	33.6	5.9	19	18.6	5.8	23	23.2	5.9	67	20.1	6.3
3	6	15.8	6.5	13	15.1	5.9	18	15.5	6.6	15	14.7	6.5	9	9.1	6.4	29	8.7	6.5
4	6	15.8	8.0	0	-	-	11	9.5	7.4	3	2.9	8.3	2	2.0	7.5	12	3.6	7.6
5	3	7.9	8.7	0	-	-	5	4.3	8.6	3	2.9	8.0	1	1.0	8.0	5	1.5	8.2
6	0	-	-	0	-	-	1	0.9	9.0	0	-	-	0	-	-	0	-	-
Totals	38			86			116			102			99			333		
% repeat spawners		73.7			58.1			79.3			70.6			56.6			49.0	
Female																		
0	8	23.5	4.9	39	41.9	4.8	25	22.7	5.1	33	28.5	4.9	54	39.7	4.7	186	46.7	5.0
1	1	2.9	5.0	22	23.7	5.2	19	17.3	5.6	26	22.4	5.2	20	14.7	5.4	58	14.6	5.4
2	7	20.6	6.4	20	21.5	5.3	30	27.3	5.9	26	22.4	6.0	31	22.8	6.0	91	22.9	6.2
3	7	20.6	7.7	8	8.6	6.0	19	17.3	7.1	24	20.7	6.3	23	16.9	6.9	32	8.0	6.8
4	5	14.7	7.6	3	3.2	7.7	10	9.1	7.8	2	1.7	8.0	6	4.4	8.0	23	5.8	8.2
5	6	17.7	9.0	1	1.1	8.0	5	4.5	9.2	4	3.5	8.3	2	1.5	8.5	8	2.0	8.9
6	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
7	0	-	-	0	-	-	2	1.8	10.0	1	0.9	10.0	0	-	-	0	-	-
Totals	34			93			110			116			136			398		
% repeat spawners		7.6			58.1			77.3			71.6			60.3			53.3	
Sexes combined																		
% repeat spawners		75.0			58.1			78.3			71.1			58.7			51.3	

TABLE 19. Spawning history of blueback herring, by sex and location, Saint John River, 1981.

No. previous spawnings	Kennebecasis Bay			Washademoak Lake			Grand Lake			Indian Lake			Oromocto River			Mactaquac Dam		
	No.	%	Mean age	No.	%	Mean age	No.	%	Mean age	No.	%	Mean age	No.	%	Mean age	No.	%	Mean age
Male																		
0	7	8.3	3.9	51	48.1	3.4	8	28.6	3.5	8	42.1	3.9	9	36.0	3.6	69	21.0	4.1
1	4	4.8	5.0	41	38.7	4.2	15	53.6	4.7	7	36.8	4.0	8	32.0	4.4	104	31.7	4.8
2	6	7.1	5.8	3	2.8	5.7	2	7.1	6.0	2	10.5	5.5	2	8.0	4.5	39	11.9	5.6
3	9	10.7	6.6	3	2.8	6.0	1	3.6	6.0	2	10.5	5.5	2	8.0	7.0	29	8.8	6.3
4	26	31.0	7.6	4	3.8	7.0	2	7.1	8.0	0	-	-	4	16.0	7.5	40	12.2	7.5
5	20	23.8	8.2	2	1.9	8.0	0	-	-	0	-	-	0	-	-	24	7.3	8.3
6	8	9.5	9.1	2	1.9	9.0	0	-	-	0	-	-	0	-	-	18	5.5	9.1
7	2	2.4	10.0	0	-	-	0	-	-	0	-	-	0	-	-	2	0.6	9.5
8	2	2.4	10.5	0	-	-	0	-	-	0	-	-	0	-	-	3	0.9	11.0
Totals	84			106			28			19			25			328		
% repeat spawners		91.7			51.9			71.4			57.9			64.0			79.0	
Female																		
0	3	2.5	4.3	26	41.9	3.7	12	31.6	3.9	4	57.1	4.0	9	26.5	4.1	68	19.4	4.4
1	6	5.0	5.2	19	30.7	4.4	9	23.6	4.4	1	14.3	4.0	18	52.9	4.6	118	33.6	5.0
2	7	5.9	6.2	6	9.7	4.8	6	15.8	4.8	0	-	-	3	8.8	5.0	56	16.0	5.6
3	15	12.6	6.8	2	3.2	5.5	5	13.2	6.2	1	14.3	6.0	0	-	-	37	10.5	6.4
4	28	23.5	7.8	4	6.5	7.3	5	13.2	7.0	1	14.3	7.0	0	-	-	27	7.7	7.8
5	27	22.7	8.3	3	4.8	7.7	1	2.6	8.0	0	-	-	4	11.7	8.3	26	7.4	8.4
6	14	11.8	9.5	0	-	-	0	-	-	0	-	-	0	-	-	10	2.9	9.4
7	12	10.1	10.1	2	3.2	4.5	0	-	-	0	-	-	0	-	-	6	1.7	10.5
8	7	5.9	11.1	0	-	-	0	-	-	0	-	-	0	-	-	3	0.9	10.7
Totals	119			62			38			7			34			351		
% repeat spawners		97.5			58.1			68.4			42.9			73.5			80.6	
Sexes combined																		
% repeat spawners		95.1			54.2			69.7			53.9			69.5			79.8	

TABLE 20-1. Mean fork lengths and weights of alewife, by sex and age, in relation to spawning history, Kennebecasis Bay, 1981.

Age	No. previous spawnings	No.	%	Mean length (mm)	SD	Mean weight (g)	SD
Male							
4	0	2	5.3	256.5	9.19	198.0	2.83
4	1	1	2.6	253.0	0.00	208.0	0.00
5	0	7	18.4	261.1	6.04	215.6	18.84
5	1	2	5.3	269.5	13.44	246.0	39.60
5	2	3	7.9	271.7	2.08	238.0	16.46
6	0	1	2.6	263.0	0.00	206.0	0.00
6	1	3	7.9	270.0	13.00	240.7	33.50
6	2	4	10.5	275.8	6.90	254.5	33.85
6	3	4	10.5	277.5	10.41	258.8	15.33
7	3	1	2.6	278.0	0.00	226.0	0.00
7	4	1	2.6	294.0	0.00	332.0	0.00
8	3	1	2.6	289.0	0.00	281.0	0.00
8	4	4	10.5	287.3	2.99	290.5	38.16
8	5	1	2.6	284.0	0.00	266.0	0.00
9	4	1	2.6	297.0	0.00	326.0	0.00
9	5	2	5.3	289.0	1.41	298.0	2.83
Female							
4	0	2	5.9	249.5	6.36	191.0	21.21
5	0	5	14.7	270.4	11.93	246.6	33.21
5	1	1	2.9	278.0	0.00	264.0	0.00
5	2	2	5.9	273.0	11.31	269.0	18.38
6	0	1	2.9	288.0	0.00	305.0	0.00
6	2	1	2.9	284.0	0.00	269.0	0.00
6	3	1	2.9	289.0	0.00	297.0	0.00
7	2	3	8.8	292.3	13.28	297.3	46.23
7	4	2	5.9	308.0	5.66	314.0	18.38
9	2	1	2.9	295.0	0.00	309.0	0.00
8	3	6	17.7	296.5	12.41	323.0	43.94
8	4	3	8.8	301.7	3.51	317.0	19.47
8	5	2	5.9	307.0	5.66	358.0	15.56
9	5	2	5.9	302.0	7.07	362.0	18.49
10	5	2	5.9	302.5	3.54	325.0	26.87

TABLE 20-2. Mean fork lengths and weights of alewife, by sex and age, in relation to spawning history, Washademoak Lake, 1981.

Age	No. previous spawnings	No.	%	Mean length (mm)	SD	Mean weight (g)	SD
Male							
3	0	1	1.2	191.0	0.00	87.0	0.00
4	0	12	14.0	255.1	12.57	213.0	31.65
4	1	3	3.5	258.3	4.16	226.7	21.22
4	2	1	1.2	259.0	0.00	223.0	0.00
5	0	18	20.9	266.8	9.64	249.1	33.80
5	1	8	9.3	269.4	7.54	253.3	28.58
5	2	15	17.4	267.5	12.70	249.5	32.39
5	3	4	4.7	273.0	8.87	272.5	25.36
6	0	5	5.8	279.4	5.73	282.6	29.57
6	1	6	7.0	268.0	8.56	237.2	16.64
6	2	2	2.3	271.0	14.14	248.5	64.35
6	3	7	8.1	268.7	13.95	267.1	30.78
7	2	2	2.3	277.5	0.71	286.0	22.63
7	3	2	2.3	279.0	7.07	271.5	3.54
Female							
3	0	1	1.1	218.0	0.00	131.0	0.00
4	0	10	10.8	255.1	19.24	225.6	58.88
4	1	3	3.2	272.7	16.44	262.0	50.11
4	2	1	1.1	270.0	0.00	234.0	0.00
5	0	25	26.9	273.0	10.98	273.0	45.69
5	1	12	12.9	279.1	11.85	272.3	38.69
5	2	13	14.0	275.1	9.73	276.4	49.68
5	3	2	2.2	273.5	4.95	270.0	32.53
6	0	3	3.2	275.3	12.06	306.7	47.96
6	1	7	7.5	382.1	7.20	276.6	28.87
6	2	6	6.5	277.7	10.52	303.8	34.71
6	3	5	5.4	281.8	10.64	326.4	38.47
7	4	2	2.2	292.0	5.66	401.0	79.20
8	3	1	1.1	302.0	0.00	381.0	0.00
8	5	1	1.1	312.0	0.00	333.0	0.00
9	4	1	1.1	300.0	0.00	285.0	0.00

TABLE 20-3. Mean fork lengths and weights of alewife, by sex and age, in relation to spawning history, Grand Lake, 1981.

Age	No. previous spawnings	No.	%	Mean length (mm)	SD	Mean weight (g)	SD
Male							
4	0	1	0.9	234.0	0.00	170.0	0.00
4	1	3	2.6	258.0	13.00	205.3	27.14
4	2	1	0.9	264.0	0.00	200.0	0.00
5	0	21	18.1	272.5	7.11	269.7	23.07
5	1	6	5.2	267.7	9.18	255.5	32.67
5	2	14	12.1	272.6	7.26	253.4	19.09
5	3	3	2.6	270.0	5.00	253.0	19.67
6	0	2	1.7	272.5	7.78	257.0	4.24
6	1	8	6.9	270.4	9.86	264.0	54.19
6	2	13	11.2	276.0	7.83	269.3	22.83
6	3	7	6.0	273.1	7.54	270.6	31.09
6	4	1	0.9	261.0	0.00	239.0	0.00
7	1	1	0.9	275.0	0.00	261.0	0.00
7	2	11	9.5	283.2	7.80	290.5	25.27
7	3	2	1.7	278.0	5.66	281.5	0.71
7	4	5	4.3	276.4	7.27	281.4	24.83
7	5	1	0.9	280.0	0.00	262.0	0.00
8	3	6	5.2	286.5	3.83	290.8	26.65
8	4	5	4.3	287.0	6.63	301.6	14.22
9	5	4	3.5	291.3	13.28	315.8	21.38
9	6	1	0.9	291.0	0.00	271.0	0.00
Female							
4	0	2	1.8	251.5	6.36	211.0	7.07
4	2	1	0.9	263.0	0.00	233.0	0.00
5	0	18	16.4	273.7	9.81	265.8	33.58
5	1	8	7.3	276.9	7.06	275.9	32.70
5	2	12	10.9	276.8	5.47	277.7	29.80
6	0	5	4.6	275.8	12.91	266.8	25.28
6	1	11	10.0	284.8	11.45	304.7	39.59
6	2	8	7.3	281.6	7.31	300.4	43.35
6	3	7	6.4	289.4	9.98	320.6	50.24
6	4	1	0.9	282.0	0.00	260.0	0.00
	2	6	5.5	285.5	6.16	317.7	40.99
7	3	4	3.6	294.0	10.23	325.0	44.16
7	4	4	3.6	288.0	8.04	291.5	28.29
8	2	3	2.7	287.7	5.03	292.3	51.21
8	3	8	7.3	294.9	7.86	327.1	40.38
8	4	1	0.9	288.0	0.00	350.0	0.00
8	5	1	0.9	303.0	0.00	363.0	0.00
9	4	4	3.6	307.0	7.53	370.8	88.87
9	5	2	1.8	299.5	13.44	383.5	103.94
10	5	2	1.8	304.0	8.49	367.0	93.34
10	7	2	1.8	300.5	10.61	309.0	9.90

TABLE 20-4. Mean fork lengths and weights of alewife, by sex and age, in relation to spawning history, Indian Lake, 1981.

Age	No. previous spawnings	No.	%	Mean length (mm)	SD	Mean weight (g)	SD
Male							
4	0	19	18.6	251.4	11.20	206.6	21.40
4	1	4	3.9	263.8	7.41	224.5	28.91
4	2	2	2.0	257.0	9.90	194.0	8.49
5	0	11	10.8	262.7	10.10	226.1	33.81
5	1	12	11.8	265.2	12.04	227.4	40.56
5	2	5	4.9	273.8	7.36	262.6	50.58
5	3	1	1.0	272.0	0.00	247.0	0.00
6	1	15	14.7	276.1	6.03	246.1	17.83
6	2	7	6.9	282.9	10.61	287.1	40.99
6	3	9	8.8	273.9	8.72	255.2	24.07
7	1	1	1.0	301.0	0.00	336.0	0.00
7	2	5	4.9	283.4	11.19	264.2	29.35
7	3	2	2.0	288.5	9.19	305.5	20.51
7	4	1	1.0	292.0	0.00	325.0	0.00
8	3	3	2.9	289.3	2.08	294.0	12.12
8	5	3	2.9	290.3	5.03	312.7	16.56
9	4	2	2.0	283.5	4.95	282.5	31.82
Female							
4	0	7	6.0	255.0	7.26	210.1	31.50
4	1	2	1.7	268.5	14.85	269.0	72.12
4	2	2	1.7	278.5	3.54	250.5	7.78
5	0	23	19.8	273.3	9.19	259.8	35.19
5	1	16	13.8	267.8	9.40	238.1	31.52
5	2	5	4.3	277.0	9.67	269.2	40.57
5	3	3	2.6	268.0	19.92	247.0	69.29
6	0	3	2.6	279.0	6.56	272.7	64.66
6	1	8	6.9	288.9	7.94	301.4	47.18
6	2	11	9.5	283.5	15.00	287.5	61.12
6	3	14	12.1	282.3	8.60	283.0	44.20
7	2	8	6.9	290.9	5.99	304.3	35.62
7	3	4	3.5	294.0	13.98	301.8	21.96
7	4	1	0.9	278.0	0.00	235.0	0.00
8	3	3	2.6	302.7	2.52	323.0	37.04
8	5	3	2.6	296.7	7.02	300.3	34.27
9	4	1	0.9	298.0	0.00	306.0	0.00
9	5	1	0.9	312.0	0.00	313.0	0.00
10	7	1	0.9	304.0	0.00	321.0	0.00

TABLE 20-5. Mean fork lengths and weights of alewife, by sex and age, in relation to spawning history, Oromocto River, 1981.

Age	No. previous spawnings	No.	%	Mean length (mm)	SD	Mean weight (g)	SD
Male							
3	0	1	1.0	237.0	0.00	191.0	0.00
4	0	10	10.1	255.9	9.59	215.3	33.68
4	1	6	6.1	247.8	8.80	208.5	19.85
4	2	1	1.0	252.0	0.00	226.0	0.00
5	0	29	29.3	266.5	19.91	229.4	34.17
5	1	7	7.1	261.1	10.09	235.0	42.47
5	2	8	8.1	271.9	4.52	246.8	26.79
6	0	3	3.0	261.7	12.10	242.0	19.97
6	1	8	8.1	271.8	6.73	260.6	16.01
6	2	7	7.1	278.7	7.89	297.4	42.98
6	3	6	6.1	278.3	14.00	288.8	75.69
7	2	7	7.1	283.4	5.77	308.4	36.15
7	3	2	2.0	284.0	1.41	320.0	22.63
7	4	1	1.0	292.0	0.00	277.0	0.00
8	3	1	1.0	285.0	0.00	263.0	0.00
8	4	1	1.0	296.0	0.00	362.0	0.00
8	5	1	1.0	293.0	0.00	353.0	0.00
Female							
3	0	1	0.7	216.0	0.00	144.0	0.00
4	0	18	13.2	263.6	7.03	235.0	29.07
4	1	2	1.5	262.0	11.31	216.5	70.00
4	2	3	2.2	261.0	13.11	308.0	144.39
5	0	30	22.1	272.7	8.74	273.9	42.31
5	1	8	5.9	273.0	15.33	260.4	72.38
5	2	7	5.2	274.3	9.81	292.6	60.85
6	0	5	3.7	267.6	9.34	233.4	8.68
6	1	10	7.4	277.6	11.57	281.9	44.24
6	2	7	5.2	282.6	5.77	305.6	42.16
6	3	8	5.9	282.9	12.24	298.9	73.21
7	2	14	10.3	294.6	5.14	334.8	56.84
7	3	9	6.6	304.6	6.39	374.3	77.35
8	3	6	4.4	302.0	8.65	364.2	63.18
8	4	6	4.4	303.5	7.77	402.8	30.06
8	5	1	0.7	301.0	0.00	305.0	0.00
9	5	1	0.7	306.0	0.00	298.0	0.00

TABLE 20-6. Mean fork lengths and weights of alewife, by sex and age, in relation to spawning history, Mactaquac Dam, 1981.

Age	No. previous spawnings	No.	%	Mean length (mm)	SD	Mean weight (g)	SD
Male							
4	0	34	10.2	254.1	13.85	214.7	29.80
4	1	3	0.9	251.7	4.62	226.3	13.58
4	2	1	0.3	261.0	0.00	238.0	0.00
5	0	119	35.7	265.4	11.40	249.6	35.87
5	1	33	9.9	264.6	11.16	250.5	42.58
5	2	15	4.5	271.2	5.54	273.5	22.13
5	3	5	1.5	269.4	10.50	263.2	38.97
6	0	17	5.1	268.1	11.25	254.7	38.50
6	1	13	3.9	272.8	11.95	265.7	38.09
6	2	18	5.4	277.2	8.18	290.8	29.89
6	3	9	2.7	275.4	13.40	283.9	50.23
6	4	1	0.3	275.0	0.00	269.0	0.00
7	1	1	0.3	288.0	0.00	287.0	0.00
7	2	30	9.0	285.4	7.00	305.9	27.81
7	3	10	3.0	285.8	9.34	304.9	43.43
7	4	4	1.2	291.5	5.00	328.0	34.38
8	2	3	0.9	273.3	10.12	282.0	57.71
8	3	5	1.5	292.4	11.46	343.8	52.84
8	4	6	1.8	287.7	6.65	308.7	31.75
8	5	4	1.2	293.8	12.39	321.3	37.23
9	4	1	0.3	292.0	0.00	344.0	0.00
9	5	1	0.3	291.0	0.00	331.0	0.00
Female							
4	0	32	8.0	260.0	10.96	249.1	37.87
4	1	4	1.0	260.0	4.97	243.5	7.59
5	0	124	31.2	272.4	10.39	287.2	38.27
5	1	25	6.3	269.8	9.73	277.6	35.89
5	2	30	7.5	275.1	14.95	302.4	38.37
5	3	1	0.3	273.0	0.00	257.0	0.00
6	0	30	7.5	275.2	9.09	303.8	33.52
6	1	29	7.3	286.2	10.53	325.2	43.98
6	2	17	4.3	285.1	9.55	325.5	41.15
6	3	12	3.0	285.8	12.71	317.7	49.03
7	2	42	10.6	297.2	7.86	372.4	36.56
7	3	10	2.5	293.3	6.83	361.7	29.06
7	4	2	0.5	288.5	7.78	313.5	2.12
8	2	2	0.5	289.0	14.14	328.5	36.06
8	3	9	2.3	302.2	9.51	386.3	47.70
8	4	14	3.5	302.1	9.45	393.6	52.52
8	5	3	0.8	293.3	7.77	352.0	24.64
9	4	7	1.8	312.4	15.37	395.0	44.23
9	5	3	0.8	305.7	13.61	417.3	82.00
10	5	2	0.5	316.0	5.66	441.5	65.76

TABLE 21-1. Mean fork lengths and weights of blueback herring, by sex and age, in relation to spawning history, Kennebecasis Bay, 1981.

Age	No. previous spawnings	No.	%	Mean length (mm)	SD	Mean weight (g)	SD
Male							
3	0	2	2.4	201.0	5.66	100.5	14.85
4	0	4	4.7	225.0	7.70	128.0	16.51
4	1	1	1.2	220.0	0.00	161.0	0.00
5	0	1	1.2	242.0	0.00	198.0	0.00
5	1	2	2.4	253.5	10.61	197.5	55.86
5	2	2	2.4	244.0	11.31	160.0	38.18
6	1	1	1.2	243.0	0.00	188.0	0.00
6	2	3	3.5	249.7	10.12	203.7	40.46
6	3	4	4.7	252.8	4.99	191.0	28.43
7	2	1	1.2	246.0	0.00	197.0	0.00
7	3	5	5.9	256.6	10.88	216.0	35.08
7	4	11	12.9	258.1	8.07	221.4	35.45
8	4	15	17.7	259.4	6.16	226.9	27.89
8	5	16	18.8	260.2	7.00	231.6	30.69
8	6	1	1.2	256.0	0.00	261.0	0.00
9	5	4	4.7	263.8	2.63	231.5	17.06
9	6	5	5.9	263.8	12.24	237.8	39.64
10	6	2	2.4	270.0	2.83	258.0	57.98
10	7	2	2.4	268.5	4.95	284.0	45.25
10	8	1	1.2	281.0	0.00	298.0	0.00
11	8	1	1.2	271.0	0.00	296.0	0.00
Female							
4	0	2	1.7	226.0	0.00	128.5	0.71
4	1	1	0.8	240.0	0.00	191.0	0.00
5	0	1	0.8	248.0	0.00	199.0	0.00
5	1	3	2.5	250.0	18.19	215.3	70.50
5	2	1	0.8	248.0	0.00	235.0	0.00
5	3	1	0.8	253.0	0.00	168.0	0.00
6	1	2	1.7	260.5	4.95	274.0	21.21
6	2	3	2.5	261.3	2.08	239.3	52.92
6	3	4	3.4	261.8	5.91	232.0	56.05
7	2	2	1.7	275.5	16.26	278.0	120.21
7	3	7	5.9	266.1	10.46	214.9	34.92
7	4	7	5.9	269.3	8.12	255.1	45.32
8	3	3	2.5	276.0	9.54	270.3	33.38
8	4	19	16.0	268.2	7.70	237.1	36.15
8	5	20	16.8	268.1	6.95	262.1	51.24
9	4	2	1.7	272.5	10.61	311.0	45.25
9	5	5	4.2	268.8	8.79	244.4	36.96
9	6	7	5.9	277.9	13.69	290.1	60.57
10	5	2	1.7	283.5	6.36	339.5	68.59
10	6	7	5.9	288.3	3.86	310.4	67.22
10	7	11	9.2	278.2	10.19	281.0	64.83
11	7	1	0.8	287.0	0.00	306.0	0.00
11	8	7	5.9	288.3	7.18	329.9	43.63

TABLE 21-2. Mean fork lengths and weights of blueback herring, by sex and age, in relation to spawning history, Washademoak Lake, 1981.

Age	No. previous spawnings	No.	%	Mean length (mm)	SD	Mean weight (g)	SD
Male							
3	0	35	33.0	207.9	8.94	110.1	19.68
3	1	3	2.8	219.0	10.15	125.7	17.50
4	0	14	13.2	236.9	13.46	168.8	33.00
4	1	25	23.6	230.8	8.30	158.6	21.74
5	0	2	1.9	238.0	9.90	189.0	43.84
5	1	13	12.3	243.6	9.81	183.1	22.28
5	2	2	1.9	251.0	8.49	222.0	14.14
6	3	3	2.8	247.0	5.57	201.0	28.21
7	2	1	0.9	264.0	0.00	265.0	0.00
7	4	4	3.8	263.5	7.33	242.5	36.79
8	5	2	1.9	248.5	12.02	217.5	17.68
9	6	2	1.9	266.0	4.24	269.0	0.00
Female							
3	0	11	17.7	220.6	10.02	123.6	46.77
4	0	12	19.4	235.8	13.33	171.3	31.74
4	1	13	21.0	235.9	8.84	171.8	24.94
4	2	3	4.8	249.0	14.93	182.3	66.48
5	0	3	4.8	254.3	19.22	213.7	48.75
5	1	8	12.9	247.5	10.83	205.6	38.04
5	2	1	1.6	259.0	0.00	257.0	0.00
5	3	1	1.6	229.0	0.00	166.0	0.00
6	2	2	3.2	265.0	16.97	269.0	41.01
6	3	1	1.6	267.0	0.00	263.0	0.00
7	4	3	4.8	264.3	3.51	261.7	41.68
7	5	1	1.6	278.0	0.00	314.0	0.00
8	4	1	1.6	261.0	0.00	175.0	0.00
8	5	2	3.2	283.0	7.07	307.0	52.33

TABLE 21-3. Mean fork lengths and weights of blueback herring, by sex and age, in relation to spawning history, Grand Lake, 1981.

Age	No. previous spawnings	No.	%	Mean length (mm)	SD	Mean weight (g)	SD
Male							
3	0	4	14.3	220.8	8.02	135.8	18.93
4	0	4	14.3	234.0	11.60	162.3	32.58
4	1	6	21.4	236.5	7.15	165.3	13.60
5	1	8	28.6	244.5	11.39	185.6	29.08
6	1	1	3.6	260.0	0.00	239.0	0.00
6	2	2	7.1	248.5	4.95	206.5	0.71
6	3	1	3.6	261.0	0.00	253.0	0.00
8	4	2	7.1	251.5	14.85	220.0	25.46
Female							
3	0	1	2.6	224.0	0.00	153.0	0.00
4	0	11	29.0	241.3	7.75	190.2	22.98
4	1	5	13.2	244.8	16.04	182.2	20.72
4	2	2	5.3	253.5	7.78	203.5	3.54
5	1	4	10.5	255.0	10.63	203.0	22.24
5	2	3	7.9	260.7	6.03	233.7	12.22
6	2	1	2.6	257.0	0.00	197.0	0.00
6	3	4	10.5	259.8	4.03	229.8	9.74
7	3	1	2.6	285.0	0.00	279.0	0.00
7	4	5	13.2	274.0	11.68	282.0	68.80
8	5	1	2.6	280.0	0.00	312.0	0.00

TABLE 21-4. Mean fork lengths and weights of blueback herring, by sex and age, in relation to spawning history, Indian Lake, 1981.

Age	No. previous spawnings	No.	%	Mean length (mm)	SD	Mean weight (g)	SD
Male							
3	0	1	5.3	230.0	0.00	143.0	0.00
3	1	1	5.3	217.0	0.00	130.0	0.00
4	0	7	36.8	235.0	7.12	175.9	16.34
4	1	5	26.3	228.0	6.47	155.6	9.94
5	1	1	5.3	245.0	0.00	200.0	0.00
5	2	1	5.3	235.0	0.00	156.0	0.00
5	3	1	5.3	235.0	0.00	189.0	0.00
6	2	1	5.3	261.0	0.00	250.0	0.00
6	3	1	5.3	250.0	0.00	199.0	0.00
Female							
4	0	4	57.1	235.3	7.59	176.0	12.83
4	1	1	14.3	247.0	0.00	205.0	0.00
6	3	1	14.3	264.0	0.00	245.0	0.00
7	4	1	14.3	273.0	0.00	300.0	0.00

TABLE 21-5. Mean fork lengths and weights of blueback herring, by sex and age, in relation to spawning history, Oromocto River, 1981.

Age	No. previous spawnings	No.	%	Mean length (mm)	SD	Mean weight (g)	SD
Male							
3	0	4	16.0	222.5	11.68	137.5	17.41
4	0	5	20.0	233.6	10.62	163.0	22.24
4	1	5	20.0	229.8	4.09	155.0	21.15
4	2	1	4.0	240.0	0.00	176.0	0.00
5	1	3	12.0	253.0	14.80	201.0	51.86
5	2	1	4.0	235.0	0.00	178.0	0.00
7	3	2	8.0	265.5	6.36	216.5	28.99
7	4	2	8.0	262.0	7.07	226.0	1.41
8	4	2	8.0	267.5	3.54	265.0	1.41
Female							
3	0	1	2.9	225.0	0.00	137.0	0.00
4	0	6	17.7	249.5	11.00	194.8	30.35
4	1	8	23.5	238.4	11.95	163.3	26.45
4	2	1	2.9	248.0	0.00	202.0	0.00
5	0	2	5.9	240.5	0.71	173.5	13.44
5	1	10	29.4	242.4	13.87	196.1	28.69
5	2	1	2.9	254.0	0.00	191.0	0.00
6	2	1	2.9	250.0	0.00	178.0	0.00
8	5	3	8.8	280.7	5.03	305.3	27.79
9	5	1	2.9	283.0	0.00	288.0	0.00

TABLE 21-6. Mean fork lengths and weights of blueback herring, by sex and age, in relation to spawning history, Mactaquac Dam, 1981.

Age	No. previous spawnings	No.	%	Mean length (mm)	SD	Mean weight (g)	SD
Male							
3	0	14	4.3	206.9	8.96	106.6	17.54
3	1	1	0.3	227.0	0.00	159.0	0.00
4	0	33	10.0	226.6	14.44	144.1	30.21
4	1	25	7.6	229.5	8.74	149.6	17.78
4	2	1	0.3	245.0	0.00	182.0	0.00
5	0	22	6.7	238.7	8.32	169.2	19.71
5	1	72	21.9	241.3	11.05	176.0	28.89
5	2	18	5.5	243.4	9.87	188.1	34.67
5	3	3	0.9	244.7	9.07	192.7	16.04
6	1	4	1.2	244.5	12.34	184.5	32.46
6	2	17	5.2	249.3	8.60	199.8	19.07
6	3	14	4.3	249.4	11.80	199.6	31.85
6	4	3	0.9	246.7	6.81	204.3	21.55
7	1	1	0.3	260.0	0.00	222.0	0.00
7	2	3	0.9	247.3	7.02	191.3	18.45
7	3	12	3.7	255.9	5.65	215.1	20.43
7	4	15	4.6	258.3	8.40	222.8	26.27
8	1	1	0.3	272.0	0.00	263.0	0.00
8	4	21	6.4	262.3	8.53	235.5	29.16
8	5	16	4.9	260.7	6.47	238.9	33.96
8	6	2	0.6	264.0	8.49	245.5	34.65
9	4	1	0.3	245.0	0.00	183.0	0.00
9	5	8	2.4	263.1	6.33	231.8	22.58
9	6	13	4.0	259.2	3.94	225.1	20.43
9	7	1	0.3	258.0	0.00	241.0	0.00
10	6	3	0.9	261.7	8.50	260.0	29.44
10	7	1	0.3	260.0	0.00	222.0	0.00
11	8	3	0.9	264.0	7.21	241.7	17.62
Female							
3	0	4	1.1	227.0	10.92	147.5	23.80
4	0	35	10.0	238.5	14.80	173.5	36.73
4	1	13	3.7	244.2	8.60	191.7	34.67
4	2	1	0.3	247.0	0.00	186.0	0.00
5	0	28	8.0	243.6	11.82	182.4	29.39
5	1	96	27.4	251.6	10.62	211.5	32.69
5	2	21	6.0	257.4	8.41	225.7	29.67
5	3	1	0.3	258.0	0.00	189.0	0.00
6	0	1	0.3	258.0	0.00	229.0	0.00
6	1	8	2.3	259.1	11.04	222.3	32.35
6	2	33	9.4	262.4	6.99	248.3	33.38
6	3	23	6.6	259.2	7.95	240.0	27.44
6	4	1	0.3	277.0	0.00	263.0	0.00
7	1	1	0.3	258.0	0.00	253.0	0.00
7	2	1	0.3	278.0	0.00	299.0	0.00
7	3	12	3.4	271.0	10.63	273.8	33.59
7	4	8	2.3	265.8	6.92	254.3	26.97
8	3	1	0.3	266.0	0.00	245.0	0.00
8	4	14	4.0	271.2	11.36	277.0	36.11
8	5	16	4.6	271.4	8.97	274.5	27.05
9	4	4	1.1	278.3	18.39	292.5	44.61
9	5	10	2.9	282.1	7.40	314.7	38.45
9	6	6	1.7	273.5	11.96	278.8	27.74
10	6	4	1.1	280.5	6.14	319.3	28.61
10	7	3	0.9	285.0	5.00	314.7	31.47
10	8	1	0.3	294.0	0.00	333.0	0.00
11	7	3	0.9	296.3	4.73	325.3	54.50
11	8	2	0.6	291.0	8.49	327.0	36.77

TABLE 22. Age at first spawning (maturity) for alewife, by sex and location, Saint John River, 1981.

Age at first spawning	Kennebecasis Bay		Washademoak Lake		Grand Lake		Indian Lake		Oromocto River		Mactaquac Dam	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Male												
2	0	-	5	10.0	6	6.5	4	5.6	1	1.8	7	4.3
3	10	35.7	26	52.0	31	33.7	22	30.6	22	38.6	39	23.9
4	13	46.4	12	24.0	29	31.5	20	27.8	17	29.8	66	40.5
5	5	17.9	7	14.0	25	27.2	25	34.7	17	29.8	47	28.8
6	0	-	0	-	1	1.1	1	1.4	0	-	4	2.5
7	0	-	0	-	0	-	0	-	0	-	0	-
Totals	28		50		92		72		57		163	
Mean age	3.8		3.4		3.8		4.0		3.9		4.0	
SD	0.72		0.86		0.94		0.97		0.87		0.90	
Female												
2	0	-	3	5.5	2	2.4	5	6.0	3	3.7	1	0.5
3	7	25.9	27	49.1	27	31.8	28	33.7	18	22.0	57	26.9
4	8	29.6	15	27.3	22	25.9	30	36.1	31	37.8	64	30.2
5	11	40.7	9	16.4	31	36.5	20	24.1	30	36.6	88	41.5
6	1	3.7	1	1.8	3	3.5	0	-	0	-	2	0.9
7	0	-	0	-	0	-	0	-	0	-	0	-
Totals	27		55		85		83		82		212	
Mean age	4.2		3.6		4.1		3.8		4.1		4.2	
SD	0.89		0.89		0.96		0.88		0.86		0.85	
Between-sexes significance ($p \leq 0.05$)	n.s.		n.s.		n.s.		n.s.		n.s.		n.s.	

TABLE 23. Age at first spawning (maturity) for blueback herring, by sex and location, Saint John River, 1981.

Age at first spawning	Kennebecasis Bay		Washademoak Lake		Grand Lake		Indian Lake		Oromocto River		Mactaquac Dam	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Male												
2	2	2.5	5	8.8	0	-	2	16.7	1	6.3	12	4.6
3	44	55.7	39	68.4	7	35.0	8	66.7	8	50.0	106	40.8
4	31	39.2	13	22.8	12	60.0	2	16.7	7	43.8	134	51.5
5	2	2.5	0	-	1	5.0	0	-	0	-	8	3.1
6	0	-	0	-	0	-	0	-	0	-	0	-
7	0	-	0	-	0	-	0	-	0	-	0	-
Totals	79		57		20		12		16		260	
Mean age	3.4		3.1		3.7		3.0		3.4		3.5	
SD	0.59		0.55		0.57		0.60		0.62		0.64	
Female												
2	1	0.9	6	16.2	3	11.5	0	-	1	4.0	5	1.8
3	58	50.0	19	51.4	17	65.4	3	100.0	12	48.0	94	33.2
4	46	39.7	12	32.4	6	23.1	0	-	12	48.0	169	59.7
5	11	9.5	0	-	0	-	0	-	0	-	14	5.0
6	0	-	0	-	0	-	0	-	0	-	1	0.4
7	0	-	0	-	0	-	0	-	0	-	0	-
Totals	116		37		26		3		25		283	
Mean age	3.6		3.2		3.1		3.0		3.4		3.7	
SD	0.67		0.69		0.59		0.00		0.58		0.61	
Between-sexes significance ($p \leq 0.05$)	n.s.		n.s.		**		no test possible		n.s.		**	

TABLE 24. Summary of age at first spawning (maturity), by sex and species, all sites combined, Saint John River, 1981.

Age at first spawning	Alewife				Blueback herring			
	Males		Females		Males		Females	
	No.	%	No.	%	No.	%	No.	%
2	23	5.0	13	2.4	22	5.0	16	3.3
3	150	32.5	164	30.2	212	47.8	203	41.4
4	157	34.0	170	31.3	199	44.8	245	50.0
5	126	27.3	189	34.8	11	2.5	25	5.1
6	6	1.3	7	1.3	0	-	1	0.2
7	0	-	0	-	0	-	0	-
Total	462		543		444		490	
Mean age	3.9		4.0		3.5		3.6	
SD	0.90		0.88		0.62		0.63	

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POOR

QUALITY

ORIGINAL